

A Study of the Impact of ESG Investments on the Liquidity Risk of Commercial Banks

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Abstract: ESG investment promotes the high-quality development of China's economy, and at the same time brings risks and challenges to the market. there is a certain contradiction between the long-cycle nature of ESG investment and the liquidity of commercial banks. In this context, how to stimulate commercial banks to take the initiative to improve ESG investment, and how ESG investment will have an impact on the liquidity risk of commercial banks has become an urgent issue to be considered. This paper selects the annual panel data of 37 commercial banks in China from 2009 to 2022, empirically tests the theoretical research hypotheses, and empirically investigates the impact of ESG investment on the liquidity risk of commercial banks by using the dynamic panel system generalised moment estimation (GMM), finally, after the above theoretical analyses and empirical studies, this paper draws the following conclusions: from the medium and long term perspective , ESG investment reduces the liquidity risk of commercial banks. Based on this, it is recommended to improve the information disclosure system and rating system of ESG investment, to promote the benign development of ESG investment in the banking industry, and to facilitate the realisation of China's "dual-carbon" goal.

Keywords: ESG, liquidity risk, GMM, commercial banks

1. Introduction

Currently, most of the research around ESG investment focuses on non-financial enterprises, and the research related to the banking industry mainly focuses on the impact of ESG investment on banks' financial performance indicators. However, since the outbreak of the subprime crisis, more and more scholars have recognised the importance of improving bank governance and effectively regulating bank risk-taking. And it has been found that ESG investment compresses the quality of commercial bank earnings and limits bank liquidity, thus increasing bank risk-taking. However, there is no literature on the correlation between ESG investment and commercial bank liquidity risk. While the ESG concept as an innovative development investment concept promotes the sustainable development of banks, it also brings risks to the liquidity of commercial banks, so it is necessary to explore and research around the relationship between the impact of ESG investment on the liquidity risk of commercial banks.

Based on this, this paper empirically examines the role of ESG investment on banks' liquidity risk-taking using unbalanced annual financial panel data of 37 listed banks in China from 2009 to 2022 as well as CSI ESG rating data. The marginal contribution of this paper is mainly manifested in

three aspects: Firstly, it takes the lead in exploring the impact of ESG investment on the operation of commercial banks from the perspective of liquidity risk, expanding the related research in the field of ESG; secondly, it discusses the impact of ESG investment on banks' liquidity risk taking in a more systematic way and verifies its correlation through empirical tests. The research in this paper has an important theoretical reference value for promoting the healthy development of ESG investment in the banking industry and facilitating the realisation of China's "dual-carbon" goal.

2. Theoretical analysis and research hypothesis

The ESG investment concept is divided into three dimensions to measure the bank's business model compared to the previous CSR, and the bank will pay more attention to the implementation of the ESG concept if it wants to create its own good reputation, which in the short term may bring about the impairment of financial performance [1], and then affect the bank's risk-taking; banks achieve reputation spillover through ESG concepts, which may cover up negative information disclosure such as unethical behaviour, increase bad news hoarding[2], and raise banks' risk taking through risk accumulation. Based on the above analyses, this paper proposes research hypothesis 1a.

Hypothesis 1a: ESG investment reduces the liquidity risk of banks.

Wu and Shen [3] found that banks follow the principle of shareholderism in the implementation of ESG concepts to improve their financial performance by improving asset quality as well as reducing non-performing loans, thus reducing their own risk levels. Wang and Sarkis [4] from the perspective of corporate governance found that ESG investment has a positive impact on its own financial performance by improving resource allocation and optimising the business structure of the enterprise; El Ghoul et al. [5] and other scholars used US banks as a sample and found that banks with a high level of corporate social responsibility (CSR) perform better in terms of both financial performance and firm value. performance, as well as lower risk-taking. Based on the above analyses, this paper proposes research hypothesis 1b.

Hypothesis 1b: ESG investment reduces banks' liquidity risk.

3. Research Design

3.1. Data source and sample selection

This paper takes the data of 37 listed banks in China from 2009 to 2022 as the research sample. The relevant financial data of Chinese listed banks mainly come from CSMAR database, some missing data are supplemented by WIND database and banks' financial statements, and the data of CSI ESG ratings come from Flush iFinD database.

3.2. Explanation of Variables

Explained variable: bank liquidity risk

The Measures on Liquidity Risk Management of Commercial Banks improve the liquidity management of commercial banks through stricter management and the establishment of a perfect, unified, standardised and comprehensive liquidity management mechanism, so as to achieve a safe and reasonable liquidity allocation and ensure the stable development of banks, and the liquidity supervision indicators proposed in the Measures mainly include the liquidity coverage ratio, the net stable funding ratio, the liquidity ratio, the high-quality liquidity assets Liquidity coverage ratio, net stable funding ratio, liquidity ratio, high-quality liquid assets adequacy ratio and liquidity matching ratio are the five indicators. The liquidity coverage ratio measures the short-term liquidity risk of a bank, while the net stable funding ratio measures the long-term liquidity risk, with a minimum standard of 100 per cent.

Accordingly, this paper chooses the net stable funding ratio(NSFR) to measure the liquidity risk of commercial banks. The formula is as follows:

$$NSFR = \frac{\text{Stable funds available}}{\text{Stable funding requirements}} = \frac{\text{Items of equity or liabilities* Discount rate}}{\text{Asset item* Conversion rate}}$$

The variables in this paper are summarised in Table 1.

Table 1: List of variable definitions

Variable Type	Variable	Description
Explanatory variable	NSFR	Measuring the overall liquidity risk of commercial banks
Explanatory Variable	ESG	For the rating results are processed using a nine-point scale for assigning scores. The higher the score the better the ESG rating and vice versa.
	lnsize	Logarithmic total annual assets of commercial banks
	alr	Average total liabilities/average total assets
Control variable	car	Ratio of regulatory capital to risk-weighted assets
	niir	Bank non-interest income/operating income
	gdp	Year-on-year GDP growth rate

3.3. Model Setting

For the model to be established in this paper, the outbreak of the dependent variable commercial bank liquidity risk requires a certain time period accumulation, that is, the current year's commercial bank liquidity risk will be affected by the changes in the previous year's liquidity risk, so this paper will lag a period of liquidity risk level as an explanatory variable to be added to the measurement model. In this paper, in order to control the endogeneity of the model, the following systematic GMM dynamic panel regression model is established:

$$NSFR_{i,t} = \alpha_i + \beta_1 NSFR_{i,t-1} + \beta_2 ESG_{i,t} + \beta_3 \ln size_{i,t} + \beta_4 alr_{i,t} + \beta_5 car_{i,t} + \beta_6 niir_{i,t} + \beta_7 gdp_{i,t} + \varepsilon_{i,t}$$

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4. Empirical Analysis

4.1. Descriptive statistics of variables

Descriptive statistics of the variables were analysed using stata16.0 before conducting the empirical analysis and the statistical results are shown in Table 2

Table 2: Results of descriptive statistics for variables

Variable	Observed	Mean	Standard	Minimum	Maximum
year	518	2,016	4.035	2,009	2,022
id	518	19	10.69	1	37
NSFR	493	1.525	0.445	0.123	3.270
ESG	313	5.514	0.777	3	7
lnsize	493	27.65	1.796	24.07	31.31
alr	493	93.10	1.587	76.48	97.47
car	509	13.32	2.189	8.840	40.30
niir	493	19.50	10.85	-14.93	73.86
gdp	518	7.100	2.212	2.200	10.60

4.2. System GMM estimation

System GMM dynamic panel regression is performed for model (1), referring to the study of Chen Qiang (2014), and two-step system estimation is carried out using the command `xtabond2` command, in addition, this paper tests the existence of first-order differential autocorrelation and second-order differential autocorrelation of the perturbation term by Abond, and the original hypothesis of Abond test is: there is no autocorrelation of the perturbation term. Hansen over-identification constraint test was used to determine whether the instrumental variables were valid or not, and the original hypothesis of Hansen's test was that all instrumental variables were valid. The results of the dynamic panel regression are shown in Table 2, where it can be seen that the p-value of the AR(1) test for this model is <0.1 and the p-value of AR(2) is >0.1 , which indicates that there is a first-order differential autocorrelation in the perturbation terms of the models, but no second-order differential autocorrelation, and it passes the test. In addition, the p-values of Hansen's test for the model are all greater than 0.1, indicating that the original hypothesis cannot be rejected, i.e., all instrumental variables for each model are valid.

Table 3: System GMM model regression results

	(1)	(2)
L.NSFR	0.353*** (5.07)	0.339*** (4.84)
ESG	0.066*** (3.30)	0.090*** (3.41)
lnsize	0.108*** (3.84)	0.108*** (4.22)
alr	0.071 (1.36)	0.075 (1.53)
car	-0.034 (-1.43)	-0.025 (-1.14)
niir	-0.025*** (-6.55)	-0.026*** (-6.71)
gdp	0.009* (1.76)	0.006 (1.17)
Constant	-8.203 (-1.58)	-8.736* (-1.81)
Observed	299	299
AR(1)_p	0.006	0.006
AR(2)_p	0.846	0.846
Hansen_p	0.177	0.177

From the model regression results in Table 3, it can be seen that in model (1), firstly, the regression coefficient of the lagged term of NSFR is significantly positive, indicating that there is indeed a continuum of liquidity risk in commercial banks. Secondly, the regression coefficient of ESG is significantly positive at 1% confidence level, indicating that a 1% increase in ESG investment of commercial banks will increase the proportion of net stable funding of commercial banks by 0.066%, and the overall liquidity risk of commercial banks will be reduced by 0.066%, and it can be concluded that the hypothesis H1a is valid.

4.3. Robustness test

ESG investment emphasises the need for companies to fully understand the impact of their investment and financing decisions on the ecological environment, social ethics and long-term value creation (Xing Yan, 2017), which can be broadly regarded as a further extension of corporate social responsibility. In order to ensure the accuracy of the model, this paper replaces the explanatory variable ESG in the model with the ESG subcomponent S (corporate social responsibility). The CSI ESG rating systematically measures the level of social responsibility of listed companies, and scores based on nine grades of "AAA-C". This paper adopts a nine-point scale for the rating results, the higher the score, the better the ESG rating, and vice versa. Using the system GMM regression results in Table 3 (2), the regression coefficient of ESG in the regression results is significantly positive at the 1% confidence level, which can still be concluded that the hypothesis H1a is valid. And the magnitude, positivity, negativity and significance of the regression coefficients of most of the variables are similar to the regression results in Table 4.2, indicating that the previous model results are robust.

5. Research Conclusions and Policy Recommendations

This paper selects the annual panel data of 37 commercial banks in China from 2009 to 2022 to empirically test the proposed theoretical research hypotheses, empirically investigate the impact of ESG investment on commercial bank liquidity risk using the dynamic panel system generalised moment estimation (GMM), and investigate the interaction term between different micro-characteristic variables of the bank and green credit by adding the heterogeneous effects of green credit on commercial bank liquidity risk. Finally, after the above theoretical analysis and empirical research, this paper draws the following conclusions:

In the medium and long term, commercial banks conducting ESG investment business has a mitigating effect on their overall liquidity risk. Commercial banks carry out ESG investment business, increase their investment in green industry and consciously improve their sustainable development ability, which has a positive effect on improving their reputation and competitiveness, thus making it easier for commercial banks to raise funds.

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